FCC COMMENTS – NBP PUBLIC NOTICE #16

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These joint comments are being submitted by two scholars who have conducted research on technology inequality over the past 8 years. Our award-winning work on this topic includes a national survey, two books, a number of journal articles, and a recent survey of technology use in Chicago that focuses on neighborhood-level effects, such as concentrated poverty and segregation. Based on our experience, we focus our comments on measurement and research issues, as well as evidence on the costs of digital exclusion.

1A and 1B. Broadband Measures

In a recent book, we argued that daily internet use is necessary for "digital citizenship," or the ability to participate in society online (Mossberger, Tolbert and McNeal 2008). Digital citizens (who use the internet daily) have regular access to technology, including broadband access. They are more likely to have basic skills needed to perform tasks online.

Frequency of use is important as a way to measure opportunities for regular access and skill acquisition, and the relative impact of broadband use in various settings. Multiple measures of adoption and use are needed, however, for the fullest picture of broadband use and its potential benefits. Data on home adoption, public access use, and mobile use are all important for understand how and where broadband is being used, and needs for public policy.

Our 2008 study of the City of Chicago demonstrates why it is necessary to understand technology use in multiple settings. Based on a random sample telephone survey of 3,453 residents, the study included a large sample of low income and minority respondents, as well as the neighborhood characteristics of respondents.

While 25 percent of residents were completely offline in 2008, another 15 percent were "less connected," lacking home access or broadband connections. Combined, almost 40 percent of Chicago residents were offline or had limited internet access. Residents of poor communities were particularly likely to be less connected as well as completely offline, and dichotomous measures of adoption (especially use anywhere) obscures substantial disparities. African-Americans in Chicago were nearly as likely as whites to have had some experience with technology, but relied much more than white Chicago residents on technology use outside the home, including public access. Latinos lagged behind in technology use in all respects.

The Chicago data show that home access is important for frequent use, and so broadband adoption at home is a critical measure. Only 7 percent of internet users without home access go online on a daily basis, in comparison to 83 percent of Chicago residents with home access. Home access allows users the autonomy to spend more time online, to explore, and to gain experience with technology (Hargittai and Hinnant 2008). Home access is associated with higher rates of use for human capital-enhancing activities such as job search, education, health care, and political participation; technology use in multiple sites, however, increases the probability of engaging in human capital-enhancing activities even more (Hassani 2006; Mossberger, Tolbert and Stansbury 2003). These are precisely the applications that BTOP has prioritized for high-speed network investments.

All of this suggests that we need to understand use in places outside of home as well, especially when data can provide guidance for public policy for libraries or public wireless networks. Internet use at work provides a measure of technology growth in the economy. Public libraries serve an important function in providing access to those who lack it at home, and help in finding information or using the technology.

Cell phones and other wireless devices are increasing their capabilities online, and are important to track over time. Currently, however, they are not adequate as measures of full technology use. Personal computers and laptops still have an edge in terms of their ability to access information and to create content. National surveys by Pew and our recent Chicago survey show that only a small percentage of adopters use internet-enabled smart phones as a *substitute* for home internet access (in Chicago, this was only 2 percent of city residents).

c. Benchmarks – Evaluation and National Surveys (CPS and ACS)

Evaluation research is needed to measure changes in use in multiple settings, frequency of use, and types of use. The current BTOP and BIP investments offer an opportunity to observe changes over time in communities where there is the greatest need and where there will be significant investments of public resources. **It is important to provide funding for program evaluation. Simply mapping broadband subscriptions across the country is insufficient to understand whether or how the ARRA investments are changing technology use and the potential for societal benefits from increased technology use.** Such evaluation research needs to examine the impact for participants within Sustainable Broadband Adoption initiatives, for example, as well as survey research that tracks change in target communities and comparison areas. Systematic evaluation research can be expensive, especially community surveys that can measure the impact of area-wide investments. While implementers may value what they can learn from program evaluation, they often hesitate to commit scarce dollars that can instead provide more fiber or programmatic services. Rigorous program evaluation has positive spillover effects (what economists call positive externalities) and local implementers can be expected to underinvest in this important public good, because the knowledge gained from this research benefits other communities as well. There is a strong argument for providing federal funding for this evaluation, because it will offer the best information about what worked, why it worked, and whether such approaches can be replicated elsewhere.

Evaluation research that tracks changes in technology use now also lays a foundation for research in a few years that can measure the long-term benefits of those changes. Do low-income families with affordable broadband increase their activities online in the immediate term, and later use this experience to gain higher-paying jobs involving technology use at work? Do schools with cutting-edge broadband applications engage students in content creation and in new curricular activities as a result of BTOP funding? Will those schools demonstrate in a few years that they have higher graduation rates and better college acceptance rates?

In addition to providing funding for evaluation of BTOP and BIP initiatives, it is critical for the federal government to resume national large-sample survey research on technology use through venues such as the Current Population Survey (CPS) and the American Community Survey (ACS). From 1995 to 2003, the U.S. Bureau of the Census collected data on technology use through the CPS, and reports were published by the National Telecommunications and Information Administration (NTIA). Since this time, there has been only sporadic and limited data collection (CPS 2007 included three questions on technology use). Either the CPS or ACS would provide high-quality, large, and representative surveys that government agencies and independent researchers could use to track trends and analyze use for sub-samples of the population – for example, for public housing residents, or for residents of low-income areas. Typical national surveys with only a few thousand respondents are not adequate for these purposes nor do they provide sufficient numbers of respondents to conduct comparative analysis in geographic areas, such as counties, cities, or states. There are different additional benefits for each of these data sources. The CPS is the gold standard for employment data, and so this survey offers special opportunities to understand the role of broadband in the work force and as a tool for achieving economic opportunity, such as higher wages. The ACS, on the other hand, will soon provide census tract-level data that can be used to understand differences across places – for example, in low-income central city neighborhoods and in sparsely-populated rural areas.

2. COST OF DIGITAL EXCLUSION

Research offers evidence of technology's substantial benefits for individuals and society, so both non-adopters and society bear costs due to the digital exclusion (Mossberger, Tolbert and McNeal 2008).

For individuals, research shows that technology use is associated with higher wages (even when we control for factors such as age and education), and that technology use is related to civic engagement and political participation. Based on national data, these benefits, and the costs of exclusion, can be quantified.

ECONOMIC OPPORTUNITY

An analysis of the March 2003 Current Population Survey (CPS) shows that internet use is related to higher wages for all workers, and that less-educated workers stand to gain the most from internet use for work. (This is the last CPS to include questions on internet use at work). For all workers, computer use at work is predicted to increase weekly wages by $102, controlling for other factors that influence wages, such as age, education, race, ethnicity, gender, full-time or part-time status, and occupation. Internet use on the job is estimated to increase weekly earnings somewhat more – by $118. The table

below shows how this compares to other factors (for example, the "wage premium" for technology use is about one-third the expected wage increase for a bachelor's degree). Less-educated workers, who have a high school diploma or less, enjoy a technology wage premium that is nearly as high as the average worker - $90 for computer use and $111 for internet use at work. But, because these workers earn less, the pay increase that they can expect for using technology at work represents a higher percentage of their pay.

What Matters for Weekly Earnings, CPS 2003

The variables reported are all statistically significant with a 95 percent confidence interval for predicting weekly earnings. The dollar amounts are based on regression coefficients in table 2.A.1 and 2.A.2, and represent the independent effect of each variable, holding other factors constant.

	Weekly Earnings	
Variable	Model 1: Computer Use	Model 2: Internet Use
General Population (Table 2.A.1)	+$101.60	+$118.27
Education (difference, 4 yrs. college vs. h.s. diploma)	+$354.72	+$343.72
Age (per year)	+$4.86	+$4.83
Female	−$208.36	−$205.22
Latino	−$52.30	−$55.38
Asian American	−$51.92	−$52.99
African American	−$65.70	−$64.12
Urban	+$49.90	+$48.55
Suburban	+$99.37	+$98.33
*Management vs. Production	+$319.29	+$311.82
*Secretarial vs. Production	−$40.81	−$37.82
Federal Government vs. State/Nonprofits	+$189.68	+$195.96
Private Sector vs. State/Nonprofits	+$88.76	+$97.14
Full-time	+$379.59	+$373.93
Less-Educated Workers (Table 2.A.2)	+$89.76	+$111.33
Age (per year)	+$2.92	+$2.92
Female	−$133.73	−$133.78
Latino	−$72.15	−$74.13
Asian American	−$46.45	−$50.98
African American	−$27.07	−$26.89
Suburban	+$44.68	+$44.86
*Management vs. Production	+$223.69	+$219.24
*Secretarial vs. Production	−$26.02	−$23.96
Federal Government vs. State/Nonprofits	+$76.71	+$76.71
Full-time	+$290.63	+$289.01

**Selected Occupational Categories*: See tables 2.A.1 and 2.A.2 for other categories where the difference between the occupation and the reference category (production) is statistically significant.

Source: *Digital Citizenship: The Internet, Society, and Participation* (Mossberger, Tolbert and McNeal 2008), MIT Press, p. 40, Box 2.1

The Wage Premium table below shows that for less-educated workers, African Americans and Latinos are likely to earn a slightly higher percentage increase in wages because of internet use for work. In short, internet use matters for economic opportunity for all workers, and it matters somewhat more (proportionately) for disadvantaged workers.

Wage Premium for Internet Use for Less-Educated Workers

Figures below are the expected percentage difference that Internet use at work makes for wages, controlling for other factors. Predicted values estimated from table 2.A.1.

	Wage Premium/Internet Use at Work
African American Men	18.36%
African American Women	17.31%
Latino Men	16.99%
Latinas	16.11%
White Men	14.77%
White Women	13.56%

Source: *Digital Citizenship: The Internet, Society, and Participation* (Mossberger, Tolbert and McNeal 2008), MIT Press, p. 40, Box 2.1

Online courses are also associated with increased weekly earnings, according to our analysis of the 2003 CPS. Moreover, they make a greater difference for less-educated workers. For all workers, those who take courses online are predicted to have a $39 increase in weekly wages, all else equal. For those with a high school education or less, the predicted increase is markedly greater at $63 per week.

Together these findings show that digital exclusion exacts economic costs for less-educated and minority workers – those who stand to benefit the most are among those least likely to have full technology access and use through broadband or to have the skills to use technology.

CIVIC ENGAGEMENT

To the extent that technology encourages citizens to be involved in democratic processes, it generates benefits for society at large. The foundation for political participation is civic engagement – knowledge, discussion, and interest in politics and public affairs. Analyses of national survey data from the American National Election Studies (NES) and the Pew Internet and American Life Project show that technology use is associated with higher levels of civic engagement across several elections – in 2000, 2002, and 2004. (Mossberger, Tolbert and McNeal 2008)[1] The two-stage models control for other media, political variables such as partisanship and political efficacy, and demographic variables. Even controlling for the use of other media, such as newspapers and television, the use of online news is related to increased political knowledge, discussion, and interest. The effect of online news is more

[1] Two-stage estimation procedure for limited dependent variables, using logistic regression. Two-stage models control for simultaneity, or for the simultaneous influence of some factors (such as education) on both technology use and on civic engagement.

consistent than other media across the various aspects of civic engagement (knowledge, discussion and interest) and across the years in the analyses. The effects for political knowledge are greater for younger respondents.

Probability estimates allow us to quantify the likely increase that can be attributed to online news use, controlling for other factors. High use of online news was predicted to increase the likelihood of political discussion by nearly 20 percent during the Presidential election year of 2000. During the lower information mid-term (non-Presidential) elections of 2002, online news use was associated with a 37 percent increase in political knowledge; during the Presidential election of 2004, the increase was 79 percent, controlling for other factors, including political interest.

POLITICAL PARTICIPATION (VOTING)

A number of studies have revealed a positive relationship between the use of online news and voting (Tolbert and McNeal 2003; Bimber 2003; Krueger 2002; Graf and Darr 2004). Mossberger, Tolbert and McNeal (2008) examined other aspects of the internet as well, including the use of email and chat rooms for political communication. Again using two-stage models and examining the 2000, 20002 and 2004 elections, they found that all three online activities were positively associated with the likelihood of voting, but only during Presidential election years (2000 and 2004). As may be expected, email exchanges and chat room participation had a larger effect than reading online news, with chat room participation having the greatest predicted impact on voting – a nearly 40 percent increase in some cases. Newer applications such as blogs and social networking figured prominently during the 2008 campaign, and it is likely that the effects of technology increased during that election.

There are well-known inequalities in civic engagement and political participation based on education, income, and race and ethnicity (Verba, Schlozman and Brady 1995; Wolfinger and Rosenstone 1980; Rosenstone and Hansen 2003), and technology disparities threaten to widen these gaps. At the same time that technology promises to increase the involvement of young Americans, it has the unintended consequence of further disadvantaging politically other groups of the population that are already underrepresented. The costs for both individuals and society are high.

PATTERNS OF EXCLUSION, INCLUDING PLACE-BASED INEQUALITIES

The costs of exclusion are not borne equally, for technology disparities are most likely to be experienced by older, lower-income, less-educated, African-American, or Latino individuals (Mossberger, Tolbert and McNeal 2008; Fairlie 2004; Norris 2001; Katz and Rice 2002; Mossberger and Tolbert 2009), as well as individuals with disabilities (Dobransky and Hargittai 2006). Geography also matters, apart from these individual characteristics. Multi-level models show that as the median household income of a neighborhood declines, the probability of being an internet user also drops (Mossberger, Tolbert and Gilbert 2006). This is so for individuals of all racial and ethnic backgrounds, but for African-Americans, who experience higher levels of segregation and concentrated poverty, high poverty environments explain the differences in technology use between African-Americans and whites. This suggests that the costs of technology disparities are experienced unequally by communities as well as by individuals. Poor rural areas or inner city neighborhoods are more likely to lack a workforce that has the skills needed for

economic growth in the information age. Local governments responsible for high-poverty areas have more barriers to e-government use, and such communities have fewer tools to engage citizens and to encourage participation. Areas with lower political participation are likely to suffer in representation of their needs and preferences in the larger political arena. Other costs may also be construed from these place-based differences, such as a greater deficit in health information and educational opportunities online that also cluster in impoverished communities. These place-based inequalities suggest that it is important to track changes in urban and rural communities, and across neighborhoods, as federal policy promotes greater inclusion.

3. BARRIERS TO ADOPTION

Place matters for barriers to adoption as well, as we discovered in our Chicago study. The Chicago study reveals critical information about how barriers to technology use differ in poor urban neighborhoods in comparison to rural or national patterns. It is important to collect data on place of residence in future surveys, so that census tract data can be used to analyze variation in both barriers and use in urban and rural settings, and in different types of neighborhoods.

In comparison with the national data reported by Pew (Horrigan 2009), our Chicago study shows that cost is more commonly cited as the main hurdle, especially among minorities. In the Chicago survey, specific questions on barriers to broadband adoption demonstrated that availability of high-speed networks was not a problem, but that the barriers for home broadband adoption clearly tracked barriers for internet adoption in general. In rural areas availability of high-speed networks is often a significant problem. Comparing our Chicago data with national data from Pew, it is clear that cost is a much more significant barrier in Chicago – cited nearly three times as often. The national results from the 2009 Pew survey show, however, that there is racial variation for naming affordability as a problem (Horrigan 2009). The Chicago data (reported below) likely have implications for other urban areas as well in terms of the greater prevalence of cost as a barrier.

REASONS FOR NO INTERNET AT HOME
Percent of respondents who do not use the internet at home – Chicago Data - 2008

	Main reason	One reason
Don't need it/not interested	30%	48%
Cost is too high	27%	52%
Can use it elsewhere	5%	52%
Don't have time	5%	24%
Too difficult to use	9%	43%
I am worried about privacy	2%	57%
The internet is dangerous	2%	46%
Hard to use information in English	1%	19%
Physical impairment	3%	13%
Other	16%	--

REASONS FOR NO BROADBAND AT HOME
Pew Internet and American Life Project – National Data – Horrigan 2009

	Main reason
Don't need it/not interested	28%
Can't get access	16%
Cost is too high	10%
Too difficult to use	9%

The Chicago table above shows many possible measures for barriers to internet (or broadband) use, but cost, interest, and difficulty of use are the most important main reasons for not having home access. Privacy is often cited when respondents are given the option of choosing multiple reasons for not having the internet. For some groups, physical disabilities and English proficiency are also barriers, although not necessarily the main impediments. This suggests the need for tracking multiple barriers as well as for a multi-pronged approach to encouraging broadband adoption.

While urban and rural differences are important, neighborhoods within cities vary as well. The relationships described below are statistically significant influences on home internet use, and they show how barriers vary across demographic groups and across neighborhoods.

- Those who have no interest in the internet are older, more affluent, less educated, and residents of higher income neighborhoods. African-Americans are less likely than whites to say they are not interested (once we control for other factors, such as income and education).
- Those who say that the cost is too high are low-income, Latino, and female, as well as residents of neighborhoods with a high proportion of African-Americans or Latinos.
- Chicago residents who believe that the internet is too difficult to use are older, less-educated, Latino, residents of high-poverty neighborhoods, and residents of neighborhoods with a high proportion of African-Americans.

What the results from the Chicago survey indicate is that it is important to examine **differences** in barriers to adoption across groups, and to understand how barriers differ by place as well. Information on **geography and demographics** should be collected and analyzed in future research. Measuring these differences provides a foundation for creating more responsive policy solutions, and for targeting assistance effectively.

There are also policy implications as well as research implications from these findings. The first round of funding for BTOP made it difficult for urban areas to qualify for funding as underserved areas. Data on broadband subscriptions are proprietary, and many cities were unable to demonstrate that there was less than 40 percent subscribership. Federal policy has prioritized unserved rural areas, and infrastructure availability. The Chicago data show that there are substantial barriers for urban residents as well, especially cost, and that affordable broadband infrastructure promises to make a difference. Urban areas present real opportunities for making progress on digital inclusion nationally. Past Pew

surveys have indicated that urban residents and minorities are more likely than other non-adopters to say that they expect to go online someday (Lenhart 2003), and our past research using national data has shown that African-Americans and Latinos have particularly positive attitudes toward technology, even though those who live in poor urban areas are not always able to translate those attitudes into home access (Mossberger, Tolbert and Gilbert 2006). Federal policy must address gaps in both urban and rural communities, in ways that are consistent with differences in need.

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